IN THE CLAIMS:

Please revise the pending claims 1-67 and add the new claims 68-76, as follows:

1. (Currently Amended) A computer implemented method for predicting failure in a system, comprising:

measuring data associated with a system;

creating a prediction of a failure of said system using a physics based probabilistic model and said data; and

communicating said prediction.

2. (Original) The method of claim 1, wherein said measuring further comprises receiving system information from said system.

3. (Original) The method of claim 1, wherein said creating further comprises creating a prediction of a failure of a component of said system.

4. (Original) The method of claim 1, wherein said creating further comprises creating a prediction of a failure of multiple systems based on said prediction.

5. (Currently Amended) The method of claim 1, wherein said ~~measuring, creating, and communicating~~ measuring and creating steps are performed on said system.

6. (Currently Amended) The method of claim 1, further comprising comparing said prediction to ~~criteria.~~ criteria.

7. (Currently Amended) The method of claim 1, wherein at least one of said creating and communicating steps occurs at a ~~remote~~ location remote from said system.

8. (Currently Amended) The method of claim 1, wherein said physics based probabilistic model comprises multiple physics based probabilistic models.

9. (Currently Amended) The method of claim 1, further comprising ranking variables in said physics based probabilistic model according to said variable's contribution to said

prediction.

10. (Original) The method of claim 1, applied to predict failure in a material's microstructure.

11. (Currently Amended) The method of claim 1, wherein said data comprises ~~referenced~~ referred data, sensed data, and inferred data and wherein said method further comprises relating said ~~reference~~ referred data to a first set of variables, relating said sensed data to a second set of variables, and inferring a third set of variables from said sensed data.

12. (Original) The method of claim 1, further comprising sending said data to a remote location and wherein said creating occurs at said remote location.

13. (Original) The method of claim 12, further comprising receiving said prediction from said remote location.

14. (Currently Amended) The method of claim 1, further comprising developing said physics based probabilistic model prior to said creating.

15. (Currently Amended) The method of claim 14, wherein said developing further comprises:

identifying at least one failure mechanism of a component of said system from said component's characteristics selected from ~~a group comprising~~ the group consisting of: material properties, environmental conditions, design characteristics, component loading, and component usage;

identifying significant random variables of said at least one failure mechanism;

identifying statistical parameters of said significant random variables; and

formulating a strategy for physics based probabilistic analysis based on said identifying steps.

16. (Currently Amended) The method of claim 15, wherein said data comprises ~~referenced~~ referred data, sensed data, and inferred data and wherein said developing step further comprises determining which of said significant random variables are related to said ~~referenced~~ referred data, which of said significant random variables are related to said sensed data, and which of said significant random variables are inferred from said sensed data.

17. (Original) The method of claim 12, wherein said developing further comprises setting criteria for communicating said prediction.

18. (Currently Amended) The method of claim 1, wherein said physics based probabilistic model utilizes fast probability methods.

19. (Currently Amended) The method of claim 18, wherein said fast probability methods are direct fast probability methods selected from ~~a group including direct~~ the group consisting of: First Order Reliability Methods, Second Order Reliability Methods, Advanced Mean Value methods, and Mean Value methods.

20. (Currently Amended) The method of claim 18, wherein said fast probability methods are response surface fast probability methods selected from ~~a group including response surface~~ the group consisting of: First Order Reliability Methods, Second Order Reliability Methods, Advanced Mean Value methods, and Mean Value methods.

21. (Currently Amended) The method of claim 1, wherein said physics based probabilistic model utilizes simulation techniques.

22. (Currently Amended) The method of claim 21, wherein said simulation techniques are direct methods selected from ~~a group including~~ the group consisting of: Monte Carlo methods and importance sampling methods.

23. (Currently Amended) The method of claim 21, wherein said simulation techniques are response surface methods selected from ~~a group including~~ the group consisting of: Monte Carlo methods and importance sampling methods.

24. (Original) The method of claim 15, wherein at least one said failure mechanism is described by an equation and said equation is divided into a capacity section and a demand section.

25. (Currently Amended) An apparatus for predicting failure of a system, said apparatus comprising:

sensors for acquiring data from a system;

a first computer comprising:

a processor; and

a memory ~~containing~~ comprising:

instructions for measuring said data;

instructions for creating a prediction of a failure of said system using a physics based probabilistic model and said data; and

instructions for communicating said prediction; and

a communication device for communicating said prediction.

26. (Original) The apparatus of claim 25, wherein said instructions for creating further comprise instructions for predicting failure of at least one component of said system.

27. (Original) The apparatus of claim 25, wherein said instructions for measuring further comprise instructions for receiving system information from said system.

28. (Currently Amended) The apparatus of claim 27, further comprising a second computer, said second computer comprising:

a processor; and

a memory, said memory ~~containing~~ comprising:

instructions for measuring said data;

instructions for storing said data; and

instructions for sending said data to said first computer as said system information.

29. (Currently Amended) The apparatus of claim 25, further comprising:

a second computer, said second computer comprising:

a processor; and

a memory, said memory ~~containing~~ comprising:

instructions for receiving said prediction; and

instructions for communicating said prediction; and

a second communication device for communicating said prediction.

30. (Original) The apparatus of claim 25, wherein said communication device further comprises a warning signal.

31. (Currently Amended) The apparatus of claim 25, said apparatus further comprising a sending device for sending said data to a ~~remote~~ location remote from said system.

32. (Currently Amended) The apparatus of claim 31, wherein said first computer is located ~~at said remote location~~ remote from said system.

33. (Original) The apparatus of claim 25, further comprising instructions for comparing said prediction to criteria.

34. (Currently Amended) The apparatus of claim 25, wherein said physics based probabilistic model comprises multiple models.

35. (Currently Amended) The apparatus of claim 25, wherein said physics based probabilistic model comprises variables ranked according to said variables' contribution to said prediction.

36. (Original) The apparatus of claim 25, applied to predict failure in a material's microstructure.

37. (Currently Amended) The apparatus of claim 25, wherein said data comprises ~~referenced~~ referred data, sensed data, and inferred data and wherein said apparatus further comprises instructions for:

relating said ~~reference~~ referred data to a first set of variables;

relating said sensed data to a second set of variables; and

inferring a third set of variables from said sensed data.

38. (Currently Amended) The apparatus of claim 25, wherein said physics based probabilistic model utilizes fast probability methods.

39. (Currently Amended) The apparatus of claim 38, wherein said fast probability methods are direct fast probability methods selected from ~~a group including direct~~ the group consisting of: First Order Reliability Methods, Second Order Reliability Methods, Advanced Mean Value methods, and Mean Value methods.

40. (Currently Amended) The apparatus of claim 38, wherein said fast probability methods are response surface fast probability methods selected from ~~a group including response surface~~ the group consisting of: First Order Reliability Methods, Second Order Reliability Methods, Advanced Mean Value methods, and Mean Value methods.

41. (Currently Amended) The apparatus of claim 25, wherein said physics based probabilistic model utilizes simulation techniques.

42. (Currently Amended) The apparatus of claim 41, wherein said simulation techniques are direct methods selected from ~~a group including~~ the group consisting of: Monte Carlo methods~~,~~ and importance sampling methods.

43. (Currently Amended) The apparatus of claim 41, wherein said simulation techniques are response surface methods selected from ~~a group including~~ the group consisting of: Monte Carlo methods~~,~~ and importance sampling methods.

44. (Original) The apparatus of claim 25, wherein said instructions for creating further comprise instructions for creating a prediction of a failure of multiple systems based on said prediction.

45. (Currently Amended) The apparatus of claim 25, said physics based probabilistic model comprising at least one failure mechanism of a component of said system.

46. (Original) The apparatus of claim 25, wherein said at least one failure mechanism relates to a material microstructure.

47. (Original) The apparatus of claim 25, wherein said at least one failure mechanism is described by an equation and said equation is divided into a capacity section and a demand section.

48. (Currently Amended) A computer program product for predicting failure of a system

for use in conjunction with a computer system, said computer program product comprising:

a computer readable storage medium and a computer program mechanism embedded therein, said computer program mechanism ~~containing~~ comprising:

instructions for measuring data;

instructions for storing said data;

instructions for creating a prediction of failure of said system using a physics based probabilistic model and said data; and

instructions for communicating said prediction.

49. (Original) The computer program product of claim 48, wherein said instructions for measuring data further comprise instructions for receiving system information from said system.

50. (Original) The computer program product of claim 48, wherein said instructions for creating further comprise instructions for creating a prediction of a failure of at least one component of said system.

51. (Original) The computer program product of claim 48, wherein said instructions for creating further comprise instructions for creating a prediction of a failure of multiple systems based on said prediction.

52. (Currently Amended) The computer program product of claim 48, said physics based probabilistic model comprising at least one failure mechanism of a component of said system.

53. (Original) The computer program product of claim 48, wherein said at least one failure mechanism relates to a material microstructure.

54. (Original) The computer program product of claim 48, wherein said at least one failure mechanism is described by an equation and said equation is divided into a capacity section and a demand section.

55. (Original) The computer program product of claim 48, further comprising instructions for comparing said prediction to criteria.

56. (Currently Amended) The computer program product of claim 48 wherein said physics based probabilistic model comprises multiple physics based probabilistic models.

57. (Currently Amended) The computer program product of claim 48, further comprising ranking variables in said physics based probabilistic model according to said variables' contribution to said prediction.

58. (Original) The computer program product of claim 48, applied to predict failure in a material's microstructure.

59. (Currently Amended) The computer program product of claim 48, wherein said data comprises:

~~referenced~~ referred data;

sensed data; and

inferred data and wherein said apparatus further comprises:

instructions for relating said ~~reference~~ referred data to a first set of variables;

instructions for relating said sensed data to a second set of variables; and

instructions for inferring a third set of variables from said sensed data.

60. (Currently Amended) The computer program product of claim 48, wherein said physics based probabilistic model utilizes fast probability methods.

61. (Currently Amended) The computer program product of claim 60, wherein said fast probability methods are direct fast probability methods selected from ~~a~~ the group ~~including direct~~ consisting of: First Order Reliability Methods, Second Order Reliability Methods, Advanced Mean Value methods, and Mean Value methods.

62. (Currently Amended) The computer program product of claim 60, wherein said fast probability methods are response surface fast probability methods selected from ~~a~~ the group ~~including response surface~~ consisting of: First Order Reliability Methods, Second Order Reliability Methods, Advanced Mean Value methods, and Mean Value methods.

63. (Currently Amended) The computer program product of claim 48, wherein said physics based probabilistic model utilizes simulation techniques.

64. (Currently Amended) The computer program product of claim 63, wherein said simulation techniques are direct methods selected from ~~a group including~~ the group consisting of: Monte Carlo methods, and importance sampling methods.

65. (Currently Amended) The computer program product of claim 63, wherein said simulation techniques are response surface methods selected from ~~a group including~~ the group consisting of: Monte Carlo methods, and importance sampling methods.

66. (Currently Amended) The computer program product of claim 49, further comprising:

a second computer program product, said second computer program product comprising:

a second computer readable storage medium and a second computer program mechanism embedded therein, said second computer program mechanism ~~containing~~ comprising:

instructions for measuring said data;

instructions for storing said data; and

instructions for sending said data to said first computer as said system information.

67. (Currently Amended) The computer program product of claim 48, further comprising:

a second computer program product, said second computer program product comprising:

a second computer readable storage medium and a second computer program mechanism embedded therein, said second computer program mechanism ~~containing~~ comprising:

instructions for receiving said prediction; and

instructions for communicating said prediction.

68. (New) A computer implemented method for predicting failure in a system, comprising:

determining failure mechanisms for a system;

measuring data associated with the system;

ascertaining a probability of failure for each of said failure mechanisms using a physics based first probabilistic failure model, wherein said probability of failure for each of said failure mechanisms is based at least partially on said data and said failure mechanisms;

predicting a probability of failure for the system using a physics based second probabilistic failure model, wherein said probability of failure for the system is at least partially based on said probability of failure of said failure mechanisms; and

communicating the probability of failure of the system.

69. (New) The method of claim 68, further comprising, before said ascertaining, determining one or more suitable physics based probabilistic failure models for each failure mechanism.

70. (New) The method of claim 68, wherein said failure mechanisms are selected from the group consisting of: cracking, delamination, shearing, bending, and tension fracture.

71. (New) The method of claim 68, wherein said failure mechanisms are selected from the group consisting of: material properties, environmental conditions, design characteristics, component loading, and component usage.

72. (New) The method of claim 68, wherein said probability of failure for each of said failure mechanisms is further based on variability of physical parameters of said system.

73. (New) The method of claim 68, wherein said probability of failure for each of said failure mechanisms is further based on a variability of directly sensed variables, a variability of referred variables, and a variability of inferred variables.

74. (New) A computer implemented method for predicting failure in a system, comprising:

determining failure mechanisms for a system;

measuring data associated with the system;

selecting at least one suitable physics based probabilistic failure model for each failure mechanism;

ascertaining a probability of failure for each of said failure mechanisms using a physics based first probabilistic failure model, wherein said probability of failure for each of said failure mechanisms is based at least partially on said data, said failure mechanisms, and variability of physical parameters of said system;

predicting a probability of failure for the system using a physics based second probabilistic failure model, wherein said probability of failure for the system is at least partially based on said probability of failure for each of said failure mechanisms; and

communicating said probability of failure for the system.

75. The method of claim 74, wherein said variability of physical parameters comprises a variability of directly sensed variables, a variability of referred variables, and a variability of inferred determined variables.

76. The method of claim 74, further comprising, before said communicating, determining a confidence of said probability of failure of said system based on historical failure data.